

AMENDMENTS TO THE SPECIFICATION:

Kindly amend the specification as follows:

In the paragraph beginning at page 12 line 3 to the end of paragraph ending on page 14 line 3:

Although multi-channel amplifier 300 is illustrated with four channels, each including a regulator 318-324 and amplifier 310-316 connected by conductors 319, 321, 323, and 325, output stage circuits in accordance with the present invention may include various numbers of channels, wherein at least two of the channels are independently controlled. Similarly, although array 326 is illustrated with four light emitting devices, light emitting arrays in accordance with the present invention may include any suitable number of light emitting devices. The disclosed embodiments are also useful if only a single channel is used.

A more detailed circuit diagram for a single channel laser driver (e.g. 310 in FIG. 3) is illustrated in FIG. 4. Typically, all channels in a multi-channel system will have a similar laser diode amplifier circuit. In the exemplary illustrated embodiment, laser driver amplifier 400 is a differential amplifier, which includes differential pair of transistors 421 and 422 and resistors 431 and 432, configured to produce a voltage mode output. The differential input is received at the base of transistor 421 and transistor 422. The common mode voltage of the differential pair is set by a voltage regulator 418 including a PFET pass device, 411 connected by conductor 419 to the common connection of resistors 431 and 432. This common mode voltage, V_{CM} , (effectively the supply voltage V_{CC1} for channel 1) sets the effective laser diode bias current, I_{LD} . Laser diode modulation current is set by the NPN current source 423 connected to the common emitter connection of transistors 421 and 422. In this case, the DC bias current is determined by $V_{CC(1)}$, resistor 432 and $I_{MOD(1)}$. Because the value of resistor 432 is generally fixed and $I_{MOD(1)}$ is generally preset, a variable laser current is altered by varying $V_{CC(1)}$, allowing each laser to be independently tuned to increase bit error rate (BER) performance. As noted, In the FIG. 4 illustration, V_{CC1} is the regulated

voltage for laser diode 140. Similarly, a corresponding similar driver circuit would receive V_{cc2} for channel 2 laser 142 and so forth for the other channels.

With continued reference to FIG. 4, there is also illustrated bypass capacitor 440 connected between the applied common mode voltage (V_{cc1}) and ground potential. As is known, ground potential is a common potential that is fixed at a potential value more negative than the applied common mode voltage (V_{cc1}). Generally, a voltage regulator (e.g., regulator 418) adequately regulates a voltage at low frequencies, and supplies the transient current required to maintain this regulated voltage (V_{cc1}). But the practical upper frequency limit for a regulator is about 10 kHz to about 1 MHz. Above this frequency, the voltage regulator output is typically poorly regulated, and exhibits a higher impedance than desired.

At high frequencies, bypass capacitor 440 provides transient current. The value of capacitor 440 is practically limited by chip area. Therefore, a reasonable capacitance value can only provide adequate bypassing above approximately 1GHz. The range of frequencies in between, not tracked well by a voltage regulator and not bypassed well by the capacitance, may require further circuit modifications. For example, see FIG. 5 which illustrates a laser driver output with a 10 MHz square wave. The illustrated waveform distortion is due to the excessive transient current that the laser driver might be unable to supply at this frequency.

In order to improve the waveform of FIG. 5, the circuit of FIG 6 is provided. The circuit of FIG. 6 is similar to the circuit of FIG. 4. It includes a differential amplifier (transistors 521 and 522), current source 523, load resistors 531 and 532, bypass capacitor 540 and laser 140. It also includes voltage regulator 518, with PFET 511 connected by conductor 519 to the common connection of resistors 531 and 532. In addition, the circuit of FIG. 6 also includes a compensation circuit (comprising resistor 533 and diodes 524 and 525). This internal loading reduces transient current and improves output waveform quality. This internal load demands approximately the same transient current in the opposite phase from the laser diode current. The result is a true differential operation of the output stage, reducing the transient current from the supply. An additional benefit of this load compensation is the reduction of supply-induced noise.

The matched transient currents now have a local return and will not be forced to the supply plane. The result is lower crosstalk between channels and/or transmit paths.

In the paragraph beginning at page 16 line 26 to the end at line 3 on page 17:

The circuit of FIG. 12 additionally includes a second PMOS transistor 1212 having a drain to source path connected between V_{cc} and a first output terminal, with its gate electrode connected to the gate electrode of PMOS transistor 1211, forming a current mirror. In addition, the circuit of FIG. 12 includes a fourth transistor 1224 having its collector to emitter path connected between a second output terminal and ground and its base connected to the same input voltage V_{BE} as transistor 1223, forming a current mirror. The first and second output terminals are the input terminals to the circuit 1300 of FIG. 13.